

CLAIMS

1. A semiconductor device, comprising: a wiring substrate including electrodes on a top surface and a back surface thereof; projecting electrodes formed on one surface of said wiring substrate so as to have a prescribed height; a semiconductor chip having a thickness smaller than said height of said projecting electrodes and mounted on said one surface of said wiring substrate so as to be electrically connected to said electrodes of said wiring substrate; and an electronic component having a thickness larger than that of said semiconductor chip and mounted on the other surface of said wiring substrate so as to be electrically connected to said electrodes of said wiring substrate so that said wiring substrate is warped to be recessed at said one surface.
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- 15 2. The semiconductor device according to claim 1, wherein a linear expansion coefficient of said electronic component is smaller than that of said wiring substrate.
- 20 3. The semiconductor device according to claim 1, wherein a value of a linear expansion coefficient of said electronic component is equal to or less than that of said semiconductor chip.
- 25 4. The semiconductor device according to claim 1, wherein the warping is bowl-shaped warping, and a difference in level between a central portion and a peripheral portion of said wiring substrate is equal to or less than 100 μm .
- 30 5. The semiconductor device according to claim 1, wherein said electronic component is a lamination of a plurality of semiconductor chips.
6. The semiconductor device according to claim 1, wherein said electronic component has a thickness of 0.3 mm or more.

7. The semiconductor device according to claim 1, wherein said electronic component is larger than said semiconductor chip in two-dimensional size.

5 8. The semiconductor device according to claim 1, wherein said wiring substrate is a resin substrate.

9. A semiconductor device, comprising: a wiring substrate including electrodes on a top surface and a back surface thereof; projecting electrodes formed on one surface of said wiring substrate so as to have a prescribed height; a semiconductor chip having a thickness smaller than said height of said projecting electrodes and mounted on said one surface of said wiring substrate so as to be electrically connected to said electrodes of said wiring substrate; and an electronic component mounted on the other surface of said wiring substrate so as to be electrically connected to said electrodes of said wiring substrate, said electronic component having a thickness larger than that of said first semiconductor chip and having a linear expansion coefficient smaller than that of said wiring substrate.

20 10. The semiconductor device according to claim 9, wherein said wiring substrate is a resin substrate.

11. The semiconductor device according to claim 9, wherein said electronic component has a thickness of 0.3 mm or more.

25 12. A method for manufacturing an electronic equipment by mounting a semiconductor device on a mounting board with projecting electrodes interposed therebetween, said semiconductor device having said projecting electrodes and a semiconductor chip both provided on a mounting side thereof, and having an electronic component provided on a side opposite to said mounting side, wherein

30 said semiconductor chip has a thickness smaller than a height of said projecting electrodes, said electronic component has a thickness larger than

that of said semiconductor chip, and said semiconductor device is mounted on said mounting board with said projecting electrodes interposed therebetween by aligning with said mounting board said semiconductor device warped so as to be recessed on said mounting side, and pressing said 5 semiconductor device on said mounting board with said semiconductor device being in the warped state.

13. The method for manufacturing an electronic equipment according to claim 12, wherein a linear expansion coefficient of said 10 electronic component is smaller than that of a wiring substrate.

14. The method for manufacturing an electronic equipment according to claim 12, wherein a value of a linear expansion coefficient of said 15 electronic component is equal to or less than that of said semiconductor chip.

15. The method for manufacturing an electronic equipment according to claim 12, wherein said semiconductor device is manufactured by a manufacturing process including the steps of:
20 bonding said electronic component to a wiring substrate with heating and then cooling the resultant wiring substrate, thereby mounting said electronic component on said wiring substrate such that said wiring substrate is warped so as to be recessed on said mounting side,
mounting said semiconductor chip on said mounting side of said 25 wiring substrate, and
forming said projecting electrodes on said mounting side of said wiring substrate.

16. An electronic equipment, comprising: a mounting board; a 30 wiring substrate including electrodes on a top surface and a back surface thereof and mounted on said mounting board with projecting electrodes interposed therebetween, said projecting electrodes having a prescribed height; a semiconductor chip having a thickness smaller than said height of

said projecting electrodes and mounted on a surface of said wiring substrate facing said mounting board such that said semiconductor chip is disposed in a space between said mounting board and said wiring substrate and electrically connected to said electrodes of said wiring substrate; and
5 an electronic component mounted on a surface of said wiring substrate opposite to that facing said mounting board such that said electronic component is electrically connected to said electrodes of said wiring substrate, said electronic component having a thickness larger than that of said semiconductor chip and having a linear expansion coefficient smaller
10 than that of said wiring substrate.

17. The electronic equipment according to claim 16, wherein said wiring substrate is a resin substrate.

15 18. The electronic equipment according to claim 16, wherein said electronic component has a thickness of 0.3 mm or more.

19. A portable information terminal, comprising: a housing; a mounting board mounted in said housing; a logic LSI chip mounted on said mounting board; a wiring substrate including electrodes on a top surface and a back surface thereof and mounted on said mounting board with projecting electrodes interposed therebetween, said projecting electrodes having a prescribed height; a memory or logic LSI chip having a thickness smaller than said height of said projecting electrodes and mounted on a surface of said wiring substrate facing said mounting board such that said memory or logic LSI chip is disposed in a space between said mounting board and said wiring substrate and electrically connected to said electrodes of said wiring substrate; and an electronic component mounted on a surface of said wiring substrate opposite to that facing said mounting board such that said electronic component is electrically connected to said electrodes of said wiring substrate, said electronic component having a thickness larger than that of said semiconductor chip and having a linear expansion coefficient smaller than that of said wiring substrate.
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